

Current Epidemiological Situation of Measles at The Present Stage

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Abstract: Measles remains one of the most contagious viral diseases worldwide despite the availability of an effective and safe vaccine. In recent years, the global epidemiological situation has become increasingly complicated due to declining immunization coverage, migration processes, population mobility, vaccine hesitancy, and disruptions in healthcare systems following the COVID-19 pandemic. Numerous countries have reported significant outbreaks, including regions that had previously achieved measles elimination. Uzbekistan has also experienced periodic increases in measles incidence, highlighting the importance of strengthening epidemiological surveillance and vaccination strategies. This article analyzes the current epidemiological situation of measles at the global and regional levels, examines major factors contributing to disease resurgence, and evaluates vaccination strategies and immunization coverage in Uzbekistan. Particular attention is paid to preventive measures, public health policies, and the role of routine immunization in controlling outbreaks.

Keywords: Measles, epidemiology, vaccination, immunization coverage, Uzbekistan, outbreak, public health, surveillance, MMR vaccine, infectious diseases.

Introduction: Measles is an acute viral infectious disease caused by the measles virus belonging to the genus Morbillivirus of the family Paramyxoviridae. The disease is characterized by extremely high contagiousness, airborne transmission, fever, catarrhal symptoms, conjunctivitis, and a characteristic maculopapular rash. Despite the long-standing availability of highly effective vaccines, measles continues to represent a major global public health problem.

The World Health Organization (WHO) has repeatedly emphasized that measles remains one of the leading causes of vaccine-preventable mortality among

children worldwide. Although global vaccination campaigns significantly reduced morbidity and mortality over the past two decades, recent years have demonstrated a concerning resurgence of measles in many regions of the world. WHO reports indicate that gaps in vaccination coverage and disruptions in immunization programs have contributed to increasing outbreaks globally.

The epidemiological importance of measles is determined by several factors. First, the virus possesses exceptionally high transmissibility, with a basic reproductive number (R_0) ranging from 12 to 18. Second, the disease can cause severe complications such as pneumonia, encephalitis, blindness, and death,

especially among children under five years of age and immunocompromised individuals. Third, measles outbreaks place a substantial burden on healthcare systems and may lead to significant socioeconomic consequences.

The COVID-19 pandemic also negatively affected routine childhood immunization services in many countries. Temporary suspension of vaccination campaigns, healthcare resource redistribution, and public fear of visiting medical institutions resulted in immunity gaps among children. As a consequence, many countries have experienced increased measles transmission since 2022.

At present, the epidemiological situation of measles is characterized by periodic outbreaks, importation of cases through international travel, and declining trust in vaccines in some communities. Understanding these trends is essential for developing effective prevention and control strategies.

Global Epidemiological Situation of Measles

In recent years, the global epidemiological situation of measles has worsened considerably. Although the number of measles deaths has significantly decreased since 2000 due to expanded immunization programs, WHO and UNICEF have warned that current progress remains fragile. According to WHO data, measles vaccination prevented nearly 59 million deaths between 2000 and 2024.

Despite these achievements, large outbreaks continue to occur in many countries. WHO reported that more than 22 million children worldwide missed their first measles vaccine dose in 2023, increasing the risk of outbreaks and international spread of the virus.

Several regions have demonstrated particularly alarming epidemiological trends. In the WHO European Region and Central Asia, measles incidence increased sharply during 2024 before declining in 2025. However, WHO and UNICEF emphasized that the risk of outbreaks remains high because vaccination coverage in many communities is still below the recommended threshold of 95%.

The Americas also experienced significant increases in measles cases. WHO documented more than 2,300 confirmed measles cases in the Americas during the first months of 2025, representing an eleven-fold increase compared to the same period in 2024. Most cases occurred among unvaccinated individuals or those with unknown vaccination status.

In the United States, measles outbreaks reached the highest levels observed in decades. Public health authorities linked these outbreaks to declining MMR vaccination rates and vaccine hesitancy.

Global experts identify several major factors responsible for the current resurgence of measles:

- declining routine immunization coverage;
- vaccine hesitancy and misinformation;
- international migration and travel;
- conflict situations and humanitarian crises;
- disruption of healthcare systems after the COVID-19 pandemic;
- insufficient epidemiological surveillance in some countries.

The decline in vaccination coverage below 95% is considered the most important determinant of renewed transmission. WHO emphasizes that herd immunity can only be maintained when at least 95% of the population receives two doses of measles-containing vaccine.

Current Epidemiological Situation of Measles in Uzbekistan

Uzbekistan has historically made substantial progress in measles control through national immunization programs and epidemiological surveillance systems. However, recent years have shown periodic increases in measles incidence associated with regional and global epidemiological changes.

According to regional reports and surveillance analyses, Uzbekistan experienced rising measles transmission after 2019. WHO recently reported that the country lost its measles elimination status because of sustained transmission and immunity gaps in the population.

The epidemiological pattern in Uzbekistan reflects several important factors:

1. accumulation of susceptible individuals due to missed vaccinations;
2. importation of cases from neighboring countries;
3. population mobility and migration;
4. insufficient awareness among some population groups;
5. delayed vaccination during pandemic-related healthcare disruptions.

Studies conducted in Uzbekistan during 2020–2024 demonstrated that measles cases occurred predominantly among unvaccinated children and young adults lacking complete immunization history. Clinical observations also indicated that severe forms and complications were more common among individuals without prior vaccination.

The Ministry of Health of Uzbekistan has strengthened epidemiological surveillance through laboratory

confirmation, contact tracing, and outbreak investigation measures. Modern diagnostic methods, including serological and molecular techniques, are increasingly utilized to identify circulating measles virus strains and monitor transmission pathways.

Regional outbreaks in Uzbekistan have generally been associated with clusters of under-vaccinated populations. Urban areas with high population density and active migration processes remain particularly vulnerable to rapid disease spread.

The current epidemiological situation demonstrates that measles remains a serious public health challenge for Uzbekistan despite considerable achievements in disease control.

Clinical and Public Health Significance of Measles

Measles is not merely a childhood rash illness; it can result in severe complications affecting multiple organ systems. The disease usually begins with high fever, cough, coryza, conjunctivitis, and Koplik spots, followed by a generalized rash.

Complications include:

- viral or bacterial pneumonia;
- otitis media;
- severe diarrhea and dehydration;
- encephalitis;
- blindness;
- subacute sclerosing panencephalitis;
- death.

Children under five years of age, malnourished individuals, pregnant women, and immunocompromised patients are at greatest risk for severe outcomes.

The public health significance of measles is amplified by

its extraordinary contagiousness. A single infected individual can transmit the virus to up to 90% of susceptible contacts in close settings. Therefore, even small decreases in vaccination coverage may rapidly result in outbreaks.

Economic consequences are also substantial. Outbreak response activities require extensive healthcare resources for surveillance, laboratory testing, isolation, contact tracing, and emergency immunization campaigns. Studies estimate that measles outbreaks impose considerable financial burdens on national healthcare systems.

Vaccination Strategies and Immunization Coverage in Uzbekistan

Uzbekistan has implemented a comprehensive national immunization program aimed at preventing the spread of measles and other vaccine-preventable diseases. Vaccination remains the most effective and economically beneficial strategy for reducing measles morbidity and mortality. The country follows international recommendations developed by the World Health Organization and UNICEF, particularly regarding the administration of two doses of measles-containing vaccine to ensure long-term protective immunity within the population.

The national vaccination schedule in Uzbekistan includes routine immunization with the combined measles-mumps-rubella (MMR) vaccine. The first dose is generally administered during infancy, while the second booster dose is provided at preschool age. This two-dose approach is essential because a small proportion of children may not develop sufficient immunity after the initial vaccination. Administration of the second dose significantly increases the level of seroconversion and contributes to the formation of herd immunity.

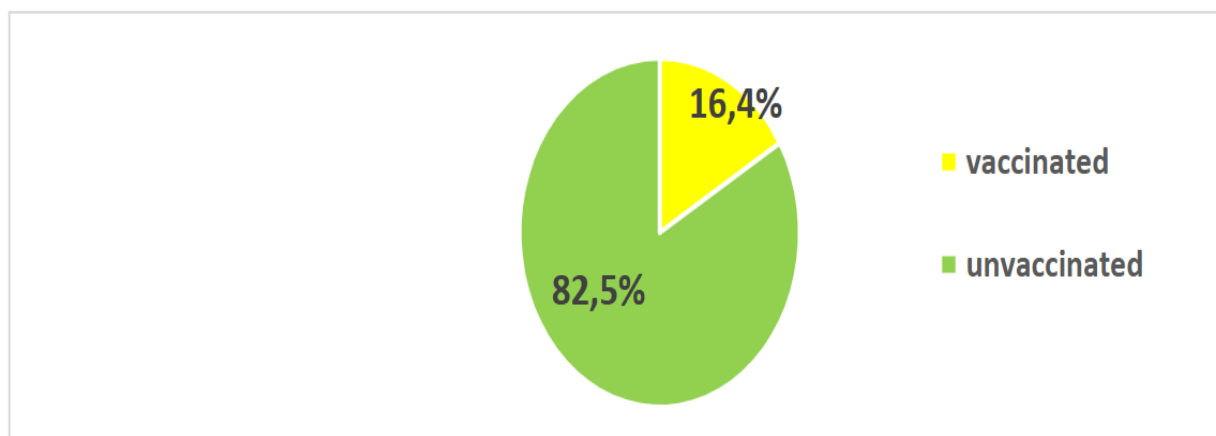


Fig. 1. Number of vaccinated and unvaccinated individuals among measles cases in 2020 (%)

The effectiveness of vaccination strategies depends largely on maintaining immunization coverage above 95%, which is considered necessary to interrupt

endemic measles transmission. In recent years, Uzbekistan has continued efforts to strengthen routine immunization services through primary healthcare

institutions, family polyclinics, maternity centers, and rural medical units. National vaccination campaigns have also been organized in regions where epidemiological risks were identified or where immunity gaps among children and adolescents were detected.

During the COVID-19 pandemic, as in many other countries, Uzbekistan experienced temporary disruptions in routine immunization activities due to

restrictions, redistribution of healthcare resources, and reduced access to healthcare services. These interruptions contributed to the accumulation of susceptible individuals within the population and increased the risk of measles outbreaks. In response, health authorities intensified catch-up vaccination campaigns and supplementary immunization activities to restore adequate population immunity.

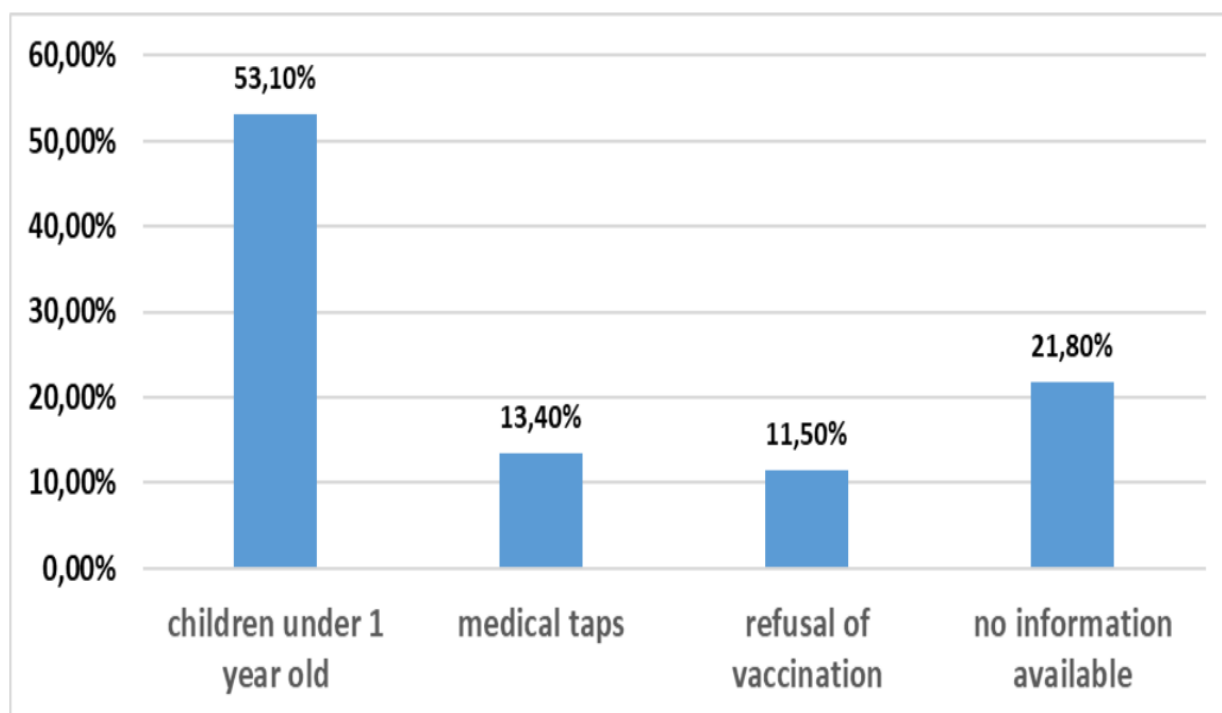


Fig. 2. Causes of measles in unvaccinated individuals (%)

Special attention has been directed toward improving epidemiological surveillance and vaccination monitoring systems. Healthcare institutions increasingly utilize digital registration technologies for recording immunization status, identifying unvaccinated individuals, and ensuring timely administration of vaccine doses. Electronic monitoring systems allow public health authorities to evaluate vaccination coverage more accurately and rapidly respond to areas with declining immunization rates.

Uzbekistan also cooperates actively with international organizations such as the World Health Organization, UNICEF, and the Global Alliance for Vaccines and Immunization (GAVI). These partnerships contribute to improving vaccine supply chains, strengthening cold-chain infrastructure, enhancing laboratory diagnostic capacities, and supporting healthcare worker training

programs. International collaboration has played a significant role in expanding access to quality vaccines and improving the overall efficiency of immunization programs throughout the country.

Public awareness campaigns are another important component of vaccination strategies in Uzbekistan. Educational programs are conducted through healthcare institutions, schools, television, social media platforms, and community outreach initiatives. These campaigns aim to increase public confidence in vaccines, combat misinformation, and explain the importance of routine immunization for protecting both individual and public health. Healthcare professionals are encouraged to provide evidence-based information regarding vaccine safety, efficacy, and possible adverse reactions in order to address parental concerns and reduce vaccine hesitancy.

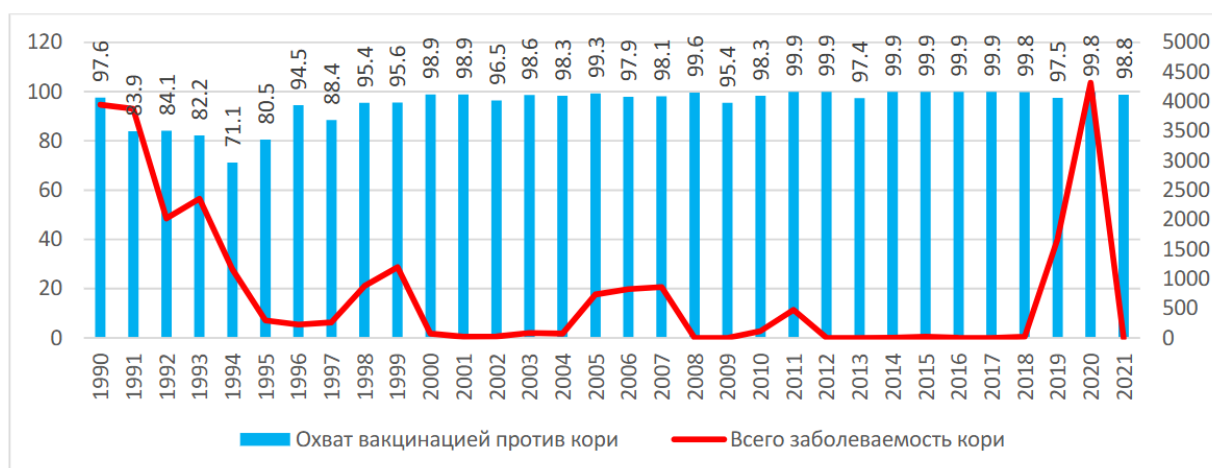


Fig. 3. Dynamics of measles incidence depending on vaccination coverage (from 1990 to 2021).

CONCLUSION

The current epidemiological situation of measles demonstrates that the disease remains a major global public health concern despite the availability of highly effective vaccines. Recent increases in measles outbreaks in many countries are associated with declining vaccination coverage, vaccine hesitancy, international migration, and healthcare disruptions following the COVID-19 pandemic.

Uzbekistan has made substantial progress in measles prevention through routine immunization programs and epidemiological surveillance. Nevertheless, periodic outbreaks and the re-establishment of measles transmission indicate the presence of immunity gaps within the population.

Vaccination remains the cornerstone of measles prevention. Maintaining immunization coverage above 95% with two vaccine doses is essential for achieving herd immunity and preventing future outbreaks. Strengthening surveillance systems, expanding public health education, and increasing vaccine confidence are critical components of successful measles control strategies.

Future efforts should focus on improving accessibility of immunization services, combating misinformation, and ensuring effective collaboration between national and international public health institutions. Only comprehensive and sustained preventive measures can ensure long-term measles elimination and protection of population health.

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